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DEPARTMENT OF AGRICULTURE

BULLETIN

SACRAMENTO, CALIFORNIA

JANUARY-FEBRUARY-MARCH
1953

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THE BULLETIN

Official Bulletin of the Department of Agriculture, devoted to Agriculture in its broadest sense. Sent free to citizens of California and offered in exchange for bulletins of the Federal Government, Experiment Stations, and other publications of a similar nature. Published Quarterly.

A. A. BROCK ..... Director
EDNA WILLIS GASKILL ..... Editor

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DEATH TAKES DR. GEORGE H. HECKE, FIRST DIRECTOR, CALIFORNIA DEPARTMENT OF AGRICULTURE

MERLE HUSSONG
Public Information Officer, Department of Agriculture

Dr. George Henry Hecke, 83, first director of the California Department of Agriculture, known through the Nation and in many parts of the world for his contribution to the welfare of agriculture, died at his ranch home, The Yolanda, near Woodland, Yolo County, California, January 13, 1953.

Funeral services were held in Woodland, January 15, with burial in Woodland Cemetery.

Dr. Hecke was also a former State Horticultural Commissioner, the first Yolo County Horticultural Commissioner, the county's first farm adviser at $1 a year, California's agricultural representative in charge of the Agricultural Building and exhibits at the San Francisco Golden Gate International Exposition, a past president of the State Association of Agricultural Commissioners, the recipient of an honorary degree from the University of California for meritorious achievements in agriculture, a well known horticultural authority and a successful rancher and stockman. Dr. Hecke was one of the first to see the need for the development of a state college of agriculture, presenting his views to Governor Pardee.

As the heart attack came, which was to end his life two days later, Dr. Hecke had nearby a copy of the Bulletin of the California Department of Agriculture. Thus, his passing was virtually in the true tradition of the West. "He died with his boots on."

Although Dr. Hecke had many honors conferred on him, it was as "the Father of the California Department of Agriculture" that he took the most pride. Until a few days before his death he made the trip each month to Sacramento to attend the meetings of the California State Board of Agriculture. He was a man of strong physical and moral courage. Although his position as the department's first director required him to assume heavy responsibilities and to make important decisions, he did not hesitate to exercise the authority given his office to protect the State's agricultural industry in times of crises.

The story of Dr. Hecke is that of an immigrant boy who dreamed of coming to California and finding success in horticulture. He was born in Hamburg, Germany, January 4, 1870. To prepare himself for his career, Dr. Hecke studied at Horticultural College, Geisenheim-on-Rhine, Germany; at the Viticultural College, Montpellier, France; worked in a nursery at Engeis, France; studied viticulture at Bordeaux, France. While employed at the Royal Kew Gardens, London, England, he studied horticulture and landscaping.

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In 1891, Dr. Hecke, answering an advertisement in a London newspaper, came to California and worked for a year as a farm laborer for the Kern County Land Company in Kern County. During that time he corresponded with Byron Jackson, San Francisco pump manufacturer, who had a ranch four miles south of Woodland. As a result, Dr. Hecke came to the Jackson ranch as a farm worker with the promise of advancement to the managership. After he became manager, he leased the property, later bought it and named it The Yolanda. It has long been one of the show ranches of Yolo County and a stopping place for agricultural leaders and students from many nations. Dr. Hecke became a naturalized citizen in 1896.

As Yolo County Horticultural Commissioner, and later as State Commissioner of Horticulture through appointment by Governor Hiram Johnson, Dr. Hecke saw the need for the organization of the State's service to agriculture, horticulture and animal husbandry in one consolidated department. He was a leader in the writing of and support of state legislation for that purpose and it was no surprise to agricultural leaders when Governor Stephens selected him as the first State Director of Agriculture. He assumed office July 22, 1919, and served with distinction until 1931.

As State Director of Agriculture, Dr. Hecke set about to build the solid foundation for a department that had before it a tremendous responsibility. He desired that every basic agricultural law to be enforced by the department be tested and tried in the courts, a principle followed by his successors as Directors of Agriculture.

Concerning the appointment of Dr. Hecke, the late C. C. Teague, of Santa Paula, one of the outstanding men in California agriculture, particularly in the field of cooperative marketing for the citrus industry, said:

"Some twenty of us, feeling that this appointment of Director of Agriculture was so important to all of us interested in horticulture, called on Governor Stephens and urged that he appoint Commissioner Hecke as Director of Agriculture. He stated to us frankly and freely that he never had any other intention except to appoint Commissioner Hecke * * *. It is seldom that we have a man who is willing, at the expense of almost an entire abandonment of his own private interests and his personal property, to devote his time and attention to the state welfare, and that is what Mr. Hecke is doing. He has made us a very efficient commissioner and I feel sure that he will make us an efficient Director of Agriculture."

Dr. Hecke was a leader in the movement to organize the agricultural officials of the Western States, British Columbia, Lower California, and the Hawaiian Islands into an association for uniform plant quarantine laws, rules and regulations and improvement in enforcement practices. Out of this movement came the present Western Plant Quarantine Board.

With others, he saw the need for a unified voice for agriculture in the Legislature and suggested the formation of an Agricultural Legislative Committee built around the cooperative marketing associations. From his thought, and with the association of others of like mind, evolved the Agricultural Legislative Committee now known as the important and

influential Agricultural Council of California of which Mr. Ralph Taylor has been the secretary for many years.

While Dr. Hecke was Director of Agriculture, foot-and-mouth disease was discovered in the State in 1924. Originating in Alameda County, the disease soon spread to many parts of California. A state of emergency was declared and strict quarantine measures to prevent further spread were invoked, with slaughter of affected animals, including wild deer, ordered at once.

There were not sufficient available funds in the State Treasury with which to indemnify the owners of animals killed in the campaign to clean-up the disease. Nevertheless, Dr. Hecke prevailed upon a number of California bankers to put up the money on his promise that the State Legislature would repay the loans. The bankers took him at his word, advanced the necessary funds, and later increased them to nearly three million dollars, without having received any security other than Dr. Hecke's promise that the State would make the loans good. Later California did just that, and every penny was repaid.

On June 10, 1926, California was declared free of the foot-and-mouth disease. Quarantine measures were rescinded and the normal activity of the State's economy was resumed.

Dr. Hecke received the honorary degree of doctor of laws from the University of California March 23, 1936. The plaque presented to him on Charter Day by President Robert G. Sproul reads:

"The Regents of the University of California in recognition of meritorious achievements, have conferred the degree of doctor of laws upon George Henry Hecke, farmer, stockman, horticulturist, able organizer and first Director of California's excellent State Department of Agriculture. Alert, zealous guardian of the State's basic industry, protector of her crops and livestock against the ravages of foreign insects and diseases, loyal servant of your adopted people."

In addition to early support of a state college of agriculture, Dr. Hecke was a long-time supporter of the University of California farm at Davis. He was made a commander of the Agricultural Legion of Honor of French Morocco. His record has appeared in Who's Who in America.

Dr. Hecke was a friend of two former Presidents, Warren G. Harding and Herbert Hoover, and was a frequent visitor to the White House. In later years, he quoted President Hoover as saying he wanted him to head the United States Department of Agriculture but that he preferred to remain in California close to The Yolanda.

Dr. Hecke married Elizabeth Welch, daughter of a pioneer Yolo County family, on January 27, 1897. Three children were born. A son, Harold, died at the age of three. Surviving are two daughters, Mrs. Leila Hardy, wife of Charles Hardy, Yolo County Agricultural Commission, and Miss Martha Hecke, an instructor at Mills College, Oakland, and three grandchildren.

Dr. Hecke was a member of the California State Grange, the California Farm Bureau Federation, and the Agricultural Committee of the San Francisco Chamber of Commerce.

APRICOT RING POX

L. C. COCHRAN, Principal Plant Pathologist, Bureau of Plant Industry, Soils, and Agricultural Engineering, Agricultural Research Administration, U. S. Department of Agriculture, in cooperation with California Agricultural Experiment Station, and GILBERT L. STOUT, Chief, Bureau of Plant Pathology, California Department of Agriculture.

Ring pox is a destructive virus disease of apricots. It was first described from Western Colorado under the name "ring spot," but the name was later changed to "ring pox," in recognition of the characteristic pox-like lesions on the fruit and the fact that another virus disease affecting apricots had been named ring spot.

The occurrence of ring pox has been recognized in Western Colorado (*1, 2, 3*), Central Washington (*4*), and Southern California. It has not been found outside the United States; therefore, it is probably indigenous to some portion of the area in which it has been found.

Ring pox ruins the value of affected apricot trees, but is generally regarded as of minor importance because of its limited occurrence and its apparent moderately slow rate of spread among orchard trees. Several hundred affected trees were removed in Mesa County, Colorado, between 1936 and 1940. Subsequently, relatively few new cases have occurred in that area (*3*). In Washington ring pox has occurred in both the Wenatchee and Yakima districts, but most of the affected trees have been removed. It is regarded there with some concern because of recurrent spread in certain local districts. The disease was discovered in Southern California in 1945 on a single infected tree in a 20-year-old orchard near Hemet. Four additional affected orchards with over 100 affected trees were found in the Hemet area in 1952.

The symptoms of ring pox occur on the fruit, leaves, and current-season twig bark of affected apricot trees. Soon after the leaves are expanded markings appear on them as irregular, angular, chlorotic spots and rings. The first leaves to expand in the spring are usually without symptoms, but obscure spots develop on successively formed leaves. The symptoms become increasingly pronounced in later growth, particularly on the rapidly growing shoots. At first the spots and rings are chlorotic but, as they increase in age, some of them and portions of others become necrotic. When the entire border of a ring or spot becomes necrotic the center dies and falls out, producing a shot-hole condition. (Fig. 1.)

Fruit symptoms do not develop until after the stones begin to harden and some fruits on affected trees appear normal until two to three weeks before they are mature. The first symptoms to appear on fruits are reddish-purple spots and rings in the peel and tissues just under the peel. As the fruit matures the colored areas become slightly raised; some become necrotic and turn reddish-brown. As the fruit reaches the soft ripe stage the necrosis increases and on some fruits it extends deep into the flesh. Necrosis seldom extends to the pit. The size and outline of the

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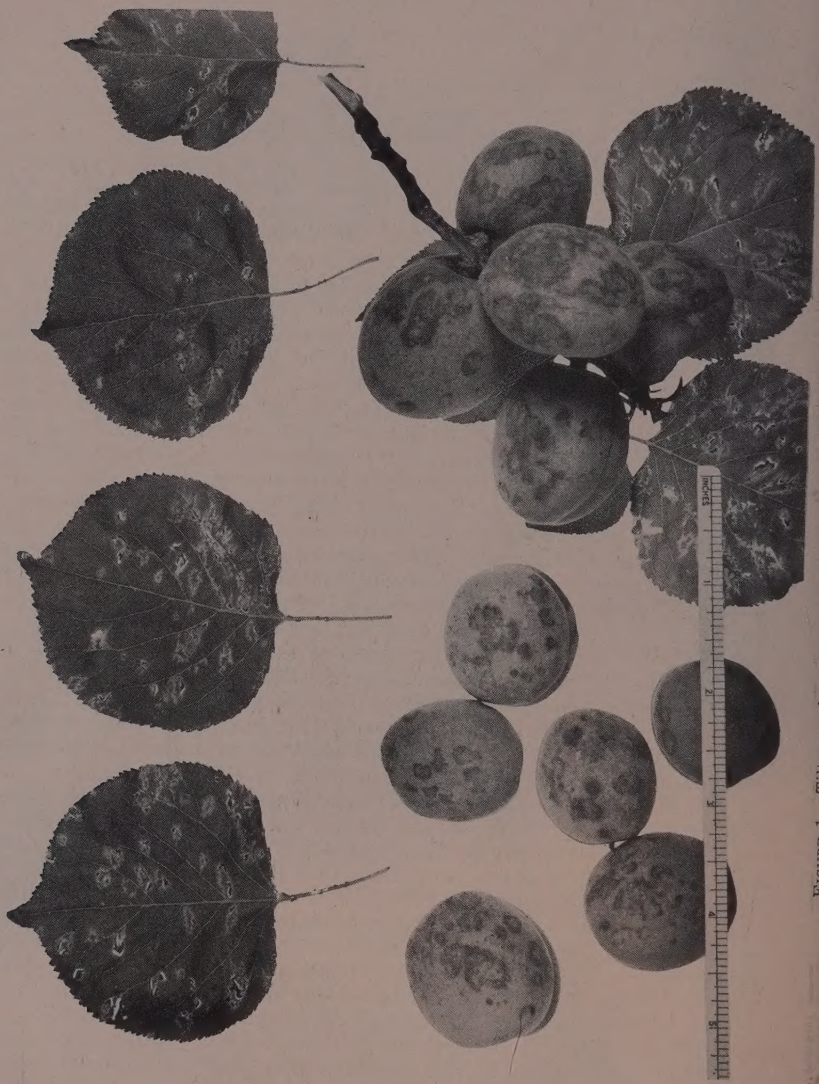
INCHES
1
2
3
4
5

FIGURE 2. Green apricot fruits showing spots and rings caused by infection with the ring pox virus

spots on the fruit are similar to those on the leaves. (Figs. 1, 2.) Where spots are grouped, they form irregular blotches and the necrotic tissue may crack and peel out, producing a scabby appearance.

Infected trees produce affected fruit annually and have shown no tendency to recover. Affected trees are not noticeably reduced in vigor and apparently suffer no ill effects other than the production of spotted leaves and worthless fruit.

Apricot varieties vary in the severity of symptom expression. Tilton, Montgamet, Chinese, and Wenatchee Moorpark all express severe symptoms. Bodine and Kreutzer (*1*) reported experimental production of characteristic symptoms on the variety Moorpark. Only one affected tree of the variety Hemskirke has been seen and the fruits on this tree appeared less severely affected than those of Tilton. No symptoms have been seen on the variety Royal. Where the varieties Royal and Tilton were experimentally inoculated with a single source of the virus, the Tiltons developed characteristic severe symptoms on both leaves and fruits, but the Royals remained symptomless. No attempt was made to recover the virus from the inoculated Royal trees, therefore, it is not known whether they are immune or may be infected without symptoms. Peach likewise has been inoculated and failed to produce symptoms. Little is known about the host range of the virus on other *Prunus* species.

The severity of symptoms is apparently influenced by environmental factors such as temperature during the growing season. Generally, fruit appears to be more severely affected on trees in Washington and Colorado than in Southern California. Symptoms were more severe on affected trees in 1952 in Southern California than in previous years. The outstanding seasonal difference was the below normal temperatures up to July 1st. The discovery of the additional affected properties and trees in Southern California is attributed to the increased severity of symptoms sufficient to cause growers to call attention to them. On one property having over 90 affected trees, the grower stated that the disease had been present for several years but that he had sold the fruit by sorting and discarding that which was badly disfigured.

Ring pox is easily transmitted by budding. When nursery-size trees are inoculated in the fall with single buds from a diseased orchard tree, symptoms appear in all parts of the inoculated trees the next growing season. Reeves (*4*) inoculated a 20-year-old Tilton tree in July and all the fruits were affected the following year. Ring pox appears to spread naturally under orchard conditions, but the rate of spread, as compared to peach mosaic, appears to be slow. In both Washington and Colorado, where most of the infected trees have been removed, recurrence has been slow.

The control of ring pox can be divided into two phases—prevention by the use of disease-free nursery stock, and reduction by diseased-tree removal. The production of ring pox-free nursery stock can be easily accomplished by using budwood from orchard trees growing in areas where the disease does not occur, or by using budwood from trees which have been found free of the disease by inspection in the proper season and by indexing or transmission test.

The evidence indicates that ring pox has been distributed in diseased nursery stock. The one orchard in Southern California which has over

90 diseased trees is approximately 20 years of age and is composed of the varieties Tilton, Wenatchee Moorpark, and Royal. All of the Wenatchee Moorpark trees are diseased and, according to grower information, were purchased as nursery stock from a nursery in the State of Washington in a district where the disease is known to occur. Many of the Tilton trees are also diseased and may represent spread into them from the Wenatchee Moorparks. None of the Royal trees showed symptoms but it is not known whether any of them are infected.

Since diseased trees generally produce commercially worthless crops they should be destroyed, thereby preventing further spread by removing a reservoir of the virus. Control by diseased-tree removal is complicated in areas where orchards are composed of mixed varieties, some of which, such as Royal, may be symptomless carriers.

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VESICULAR EXANTHEMA OF SWINE *

Dr. R. E. Duckworth, Assistant Director, California Department of Agriculture

On the morning of April 23, 1932, the dread word went out to all regulatory veterinarians in California, "Foot-and-mouth disease in hogs in Orange County, proceed at once"—and something new had been added.

It took a second outbreak a year later and the combined effort of leading foot-and-mouth disease men of the world to decide what it was. And it took 20 years to discover the economic importance of vesicular exanthema.

What have we learned about vesicular exanthema since that fateful day in April, 1932? Where did it come from? Under what guise was it lurking until it made its bow to the medical world by making hogs lame and blossoming out blisters on their noses and feet? The answer remains buried in that mysterious compost of animal and vegetable food waste we call garbage; within the structure of some bacteria or parasite; or perhaps in nature's ever-changing alchemy of transmutation. In any event, wherever it came from, whatever produced it, the fact remains that the disease is not only in the Nation's garbage but in the Nation's hair, and the problem of the public service veterinarian is how to comb it out without completely denuding the national scalp.

Let's take a hurried look at the history of vesicular exanthema in California and then ask ourselves what success can be expected by use of the stamping out or slaughter method, supplemented only by disinfection, and by quarantines. It should be pointed out here that experience with the disease in California, before and after it became established in that State, strongly suggests that the slaughter method alone, without vigorous and positive attack on the source of the disease, will fail.

It may be recalled that when the original outbreak of vesicular exanthema occurred in garbage-fed hogs in Southern California in April of 1932, full and complete stamping-out measures were rapidly and vigorously employed. The outbreak was believed to be foot-and-mouth disease, and every quarantine precaution, local and area, was applied and enforced to the fullest extent.

In this regard, it may be said that experience gained during the 1924 and 1929 outbreaks of foot-and-mouth disease was used to advantage in establishing quarantine areas and techniques, as well as operational procedures in the field. Officers of the California Highway Patrol assisted in guarding and systematically patrolling the quarantine areas. But, despite the rapidity of the eradication program, stringent quarantines and restrictions, the 1932 effort apparently failed of success.

Though treated as foot-and-mouth disease, the 1932 outbreak bears the notable distinction of actually being the first reported incidence of

* Presented at Twenty-fifth Annual Meeting, Intermountain Veterinary Medical Association, Newhouse Hotel, Salt Lake City, Utah, January 20, 1953.

A group of purebred hogs from Riverside County entered at the Imperial County Fair of 1941 was found to be in the initial stage of vesicular exanthema. As a result of contact, the disease spread to nine other entries, and in each instance was carried back to the exhibitor's home herds. This experience indicates the ease with which the disease may be transmitted through contact. Observations in California over the course of 20 years have revealed a wide variance in the rate of spread of vesicular exanthema through contact. Often it is low, at times as low as 1 percent. However, that is far from being the rule. It is common to find from 30 to 80 percent of all animals on a ranch showing visible evidence of infection.

This rather lengthy history of vesicular exanthema as it existed in California from 1932 to 1942 is for the purpose of describing the vagaries of the disease and to set down in brief detail the experience California veterinarians have had in their efforts, first to eradicate and later to control it.

From 1942 to the present time, vesicular exanthema has appeared in more or less virulent form every year from one end of the State to the other. Quarantine measures have been in effect, to a greater or lesser degree almost continuously for 20 years, whenever the disease appeared. On two occasions complete eradication campaigns were employed. Permit systems of shipping point inspections of slaughter hogs have been tried over long-time periods at least three times. Efforts at control in California have apparently been of no avail. Regardless of the method used or the length of time it was employed, the disease appeared again and again with little relation to time of year or location of origin.

Let us review some of the California experiences and observations with a view to appraising present efforts at control, and the possible success of those efforts for the future.

When it became apparent that the disease was established in California, two pertinent problems faced veterinary officials. First, it was essential that foot-and-mouth disease be considered as a possibility whenever vesicular exanthema appeared. Second, every effort must be made to restrict spread of the infection. In order to screen out foot-and-mouth disease as soon as possible, and in a manner suitable to practical field procedure, it was decided to maintain one or more bovine animals in close daily contact in pens with hogs on all garbage-feeding premises. When sick hogs are found and vesicles appear, virus is immediately collected, and transferred by inoculation to the required number of bovine animals. Quarantines are established, and daily observations of the test animals are made for at least 10 days. This, then, is the practical approach to the problem of field diagnosis.

What happens when the disease is found in stockyards or slaughterers' pens? Quarantines are placed at once, and bovine test animals are inoculated with virus collected from sick hogs. Observations are made daily for 96 hours when quarantines are revoked, and the affected hogs released for slaughter in accordance with meat inspection regulations. This procedure of handling slaughter hogs affected with vesicular exanthema has been in effect since 1948. Obviously, the primary interest has been to eliminate the possibility of foot-and-mouth disease and to confirm a diagnosis of vesicular exanthema rather than to control it, which, of course, we had found ourselves unable to accomplish.

Not always has official thinking concerning vesicular exanthema been directed in a pattern designed to diagnose the disease, or, for that matter, even to recognize its existence. It was not until April of 1945 that vesicular exanthema was given official recognition under federal meat inspection regulations. (Meat Inspection Division Memorandum No. 68, April 9, 1945, ZY-1.132.3.) Prior to that time, hogs affected with vesicular exanthema in any stage of acuteness were accepted for slaughter with only occasional condemnations of carcasses or parts. In other words, until April, 1945, so far as the federal meat inspection regulations were concerned, the disease did not exist. And yet, in spite of the fact that hundreds of acutely sick hogs were slaughtered and that carcasses or cuts went out to the trade, railroad and steamship commissaries and, very likely, to army and navy installations in some of the surrounding states, vesicular exanthema was not reported any place but in California. Why that was so and why it was not until June of 1952 that the disease made its appearance in garbage-fed hogs in Wyoming, are questions for which no answer can confidently be offered. Neither can a satisfactory explanation be offered for the rapid and widespread dissemination of the disease once it broke over the boundaries of California. It is another example of the unpredictable nature of the disease.

The question is raised as to the value of restrictive quarantines, slaughter and disinfection. As stated earlier in this paper, these time-proved methods of eradication are not likely to succeed unless the disease is attacked at its source. California quarantines, which at times were quite rigid, seemed to control it not at all. The present bureau quarantines placed in effect after vesicular exanthema was found in Nebraska in June apparently had little effect in controlling the disease, judged by spread to several states after the quarantines were invoked. Quarantines and cleaning and disinfection of yards and pens, where the disease was known to exist, have been in effect for more than five months, but still, spread to new areas continues. On December 1st it had been found in 32 states, and it is significant to note that almost all centers of infection discovered since the middle of September have been in garbage-fed hogs near large urban centers. (Dr. B. T. Simms, Chief, Bureau of Animal Industry; Bauru, Brazil, Dec. 15, 1952.)

California has had much the same experience with vesicular exanthema during the many years of its existence. Eight years ago, one of the California observers reported that vesicular exanthema does not lend itself to practical control measures in the form of quarantines, shipping permits or other regulations. He concluded that the swine industry of California would be forced to live with vesicular exanthema so long as unprocessed garbage is fed to swine. (B. B. White, Calif. Dept. of Agriculture Bulletin, July, August, September, 1944, Vol. XXXIII, No. 3.)

The same may be said today except that the swine industry of the United States, rather than California alone, may be forced to live with the disease so long as raw garbage is fed to swine. Raw garbage has long been recognized as the source of several important diseases of swine and for years, veterinarians and public health officials have deplored the feeding of unprocessed garbage. A few states have on their statutes laws requiring the cooking of garbage before it is fed, but, unfortunately, these salutary laws are not vitalized by the application

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When it became apparent that the disease was established in California, two pertinent problems faced veterinary officials. First, it was essential that foot-and-mouth disease be considered as a possibility whenever vesicular exanthema appeared. Second, every effort must be made to restrict spread of the infection. In order to screen out foot-and-mouth disease as soon as possible, and in a manner suitable to practical field procedure, it was decided to maintain one or more bovine animals in close daily contact in pens with hogs on all garbage-feeding premises. When sick hogs are found and vesicles appear, virus is immediately collected, and transferred by inoculation to the required number of bovine animals. Quarantines are established, and daily observations of the test animals are made for at least 10 days. This, then, is the practical approach to the problem of field diagnosis.

What happens when the disease is found in stockyards or slaughterers' pens? Quarantines are placed at once, and bovine test animals are inoculated with virus collected from sick hogs. Observations are made daily for 96 hours when quarantines are revoked, and the affected hogs released for slaughter in accordance with meat inspection regulations. This procedure of handling slaughter hogs affected with vesicular exanthema has been in effect since 1948. Obviously, the primary interest has been to eliminate the possibility of foot-and-mouth disease and to confirm a diagnosis of vesicular exanthema rather than to control it, which, of course, we had found ourselves unable to accomplish.

Not always has official thinking concerning vesicular exanthema been directed in a pattern designed to diagnose the disease, or, for that matter, even to recognize its existence. It was not until April of 1945 that vesicular exanthema was given official recognition under federal meat inspection regulations. (Meat Inspection Division Memorandum No. 68, April 9, 1945, ZY-1.132.3.) Prior to that time, hogs affected with vesicular exanthema in any stage of acuteness were accepted for slaughter with only occasional condemnations of carcasses or parts. In other words, until April, 1945, so far as the federal meat inspection regulations were concerned, the disease did not exist. And yet, in spite of the fact that hundreds of acutely sick hogs were slaughtered and that carcasses or cuts went out to the trade, railroad and steamship commissaries and, very likely, to army and navy installations in some of the surrounding states, vesicular exanthema was not reported any place but in California. Why that was so and why it was not until June of 1952 that the disease made its appearance in garbage-fed hogs in Wyoming, are questions for which no answer can confidently be offered. Neither can a satisfactory explanation be offered for the rapid and widespread dissemination of the disease once it broke over the boundaries of California. It is another example of the unpredictable nature of the disease.

The question is raised as to the value of restrictive quarantines, slaughter and disinfection. As stated earlier in this paper, these time-proved methods of eradication are not likely to succeed unless the disease is attacked at its source. California quarantines, which at times were quite rigid, seemed to control it not at all. The present bureau quarantines placed in effect after vesicular exanthema was found in Nebraska in June apparently had little effect in controlling the disease, judged by spread to several states after the quarantines were invoked. Quarantines and cleaning and disinfection of yards and pens, where the disease was known to exist, have been in effect for more than five months, but still, spread to new areas continues. On December 1st it had been found in 32 states, and it is significant to note that almost all centers of infection discovered since the middle of September have been in garbage-fed hogs near large urban centers. (Dr. B. T. Simms, Chief, Bureau of Animal Industry; Bauru, Brazil, Dec. 15, 1952.)

California has had much the same experience with vesicular exanthema during the many years of its existence. Eight years ago, one of the California observers reported that vesicular exanthema does not lend itself to practical control measures in the form of quarantines, shipping permits or other regulations. He concluded that the swine industry of California would be forced to live with vesicular exanthema so long as unprocessed garbage is fed to swine. (B. B. White, Calif. Dept. of Agriculture Bulletin, July, August, September, 1944, Vol. XXXIII, No. 3.)

The same may be said today except that the swine industry of the United States, rather than California alone, may be forced to live with the disease so long as raw garbage is fed to swine. Raw garbage has long been recognized as the source of several important diseases of swine and for years, veterinarians and public health officials have deplored the feeding of unprocessed garbage. A few states have on their statutes laws requiring the cooking of garbage before it is fed, but, unfortunately, these salutary laws are not vitalized by the application

of vigorous enforcement measures, and, as a result, the end sought is not achieved.

Since the advent of vesicular exanthema into the East and Middle West some of the states have taken steps to curb raw garbage feeding. Notable among those taking such action is Nebraska, which took the lead in passing legislation designed to require mandatory cooking of garbage before being fed to hogs. A special session of the legislature was called by Governor Val Petersen to act in the emergency. It was farsighted, intelligent legislation dedicated to the best interests of Nebraska and the swine raisers of that state. Governor Petersen and the legislative body of Nebraska are to be congratulated on their vision, courage and promptness of action.

What is there to do about garbage as considered from the national viewpoint of eradication? In the first place, the question may be posed in connection with eradication programs anywhere in the United States where the disease is established in garbage-fed hogs. A statement of fact may be made from which two logical questions arise. Evidence accumulated over many years of observation points conclusively to the fact that raw garbage is the source of vesicular exanthema. The first question is: "Can the legislators of a state be expected to appropriate money for indemnity for hogs slaughtered because of vesicular exanthema if they know that when the premises are restocked and the hogs exposed to raw garbage the disease will again appear?" The second question is: "Could a garbage feeder whose hogs had been destroyed because of vesicular exanthema be expected to restock his premises, knowing that his new hogs would become infected with the disease when exposed to raw garbage?" The answer is clear: the legislators *would* not—the garbage feeders *could* not.

At this point it may be said that had California maintained through 1952 the eradication program on which it embarked in 1932, and permitted the feeding of raw garbage to continue, it would have been necessary to destroy two and a half million hogs at an estimated cost in indemnities of over $50,000,000, provided, of course, that the hog feeders could have remained in business in spite of a continuous slaughter program and if the Legislature had been foolhardy enough to permit such a profligate waste of tax moneys to continue.

Regulatory officials, federal and state, are in duty bound to face the facts honestly, and to tell their people truthfully that any attempt to eradicate vesicular exanthema by means of slaughter contingent upon indemnities paid out of public funds should be subject to mandatory cooking of garbage or the complete discontinuance of garbage as a feed for swine. To continue indemnities otherwise is contrary to sound principles of disease control, and is simply a case of throwing good money after bad.

From field evidence gathered over 20 years of inspections and observations in California, it may reasonably be concluded that a program of temporary depopulation of garbage-feeding ranches, combined with cleaning and disinfection, will fail unless supplemented by other measures. Granting that such a procedure is fully carried out, the California experience indicates that it would be but a matter of time when the

disease would reappear through the medium of raw garbage. If the feeding of raw garbage to swine is continued, then regardless of quarantines, slaughter or other measures, there will be a continuation of the disease.

A point of more than passing interest is the behavior of vesicular exanthema in hogs not exposed to raw garbage (grain fed hogs). In California, of approximately 20,000 premises on which hogs are raised, 400 are garbage-feeding ranches. Over the 20-year period from 1932-1952 there have been 1,370 outbreaks of vesicular exanthema on the 400 garbage-feeding ranches. On the remaining 19,600 grain or country ranches there have been 53 outbreaks, nearly all of which were directly traceable to an interchange of animals to or from garbage-feeding ranches. The 53 outbreaks on grain or country ranches are notable because in not a single instance has there been a recurrence of the disease after it had run its course and the hogs had recovered. This record strengthens the belief that raw garbage carries the virus.

Raw garbage is the *source* of vesicular exanthema. It is an ever-present possible carrier of foot-and-mouth disease. It harbors the virus of cholera, the bacterial causes of several diseases of swine, as well as the parasites of at least one serious disease of swine and man—trichinosis. Most garbage-feeding ranches are filthy, foul and odorous, providing ideal breeding places for flies, rats and other vermin. Most of them constitute a public health problem.

It is time something is done about raw garbage, and on a national scale, not merely an optional state plan. Far too much is at stake to permit the hazardous practice of raw garbage feeding to continue.

As a result of the vesicular exanthema outbreak, the present threat to cholera antiserum production in the United States bids fair to develop into a crisis of top importance to the swine industry of the Nation. The American Veterinary Medical Association Journal for December, 1952, carries an editorial dealing with a possible nation-wide shortage of hog cholera antiserum in 1953 which should alarm every faction of the swine, livestock and packing industries, as well as the veterinary profession and the allied biological industry. The journal rightly asks whether it would not be logical now to challenge hog cholera itself. Indeed it would. For too many years this great Nation has compromised with the scourge of hog cholera. It is doubtful if we will soon again be presented with so favorable an opportunity to wipe out this costly disease. One of the national agricultural papers, in discussing the possibility of ridding this country of cholera, boldly stated that vesicular exanthema may be a blessing in disguise in affording the incentive to undertake eradication not only of vesicular exanthema but hog cholera as well. Canada succeeded and maintains its success. The eradication of cholera on Newfoundland when that Province joined the Canadian Confederation a few years ago presents a sobering example of what can be done when determined men set themselves, their resources of knowledge and their wills to a task of disease eradication, even though the disease be established and the odds forbidding.

A comparison between eradication and "control" of hog cholera has been made by Dr. S. H. McNutt, University of Wisconsin (Veterinary Medicine, 46:411, Oct., 1951). He states that "in 1946 the continued eradication of hog cholera in Canada cost six hundred dollars ($600),

while mere control in the United States cost upwards of forty million dollars ($40,000,000). * * * The situation with regard to cholera is especially unfortunate because this is a disease that need not exist in the United States. It exists only because of inertia and laxity * * *."

If vesicular exanthema bestirs us from our inertia, our laxity, and stimulates us towards the need and determination to stop the feeding of raw garbage to swine, it will indeed have been a blessing in disguise.

Eradication of hog cholera from the swine herds of the United States is certain to be undertaken in the not too distant future. In the U. S. Bureau of Animal Industry we have the largest, and we think the best, animal disease control organization in the world; we have intelligent individual state livestock sanitary officials alert to most emergencies likely to endanger the health of livestock in their states, and certainly we have the most enlightened farmers and livestock producers in the world. Why then tolerate hog cholera or vesicular exanthema, or any other disease that can be eradicated? We have the opportunity, we have the means, and we have the knowledge. Why not put them to work and clean up these two diseases?

The answer to the question of how much longer the swine industry of the Nation will continue to live with eradicable diseases lies with the industry itself. Veterinarians and regulatory agencies know what should be done and it is entirely proper that they urge legislation, when necessary, designed to control or eradicate a given disease. However, legislation must originate with the industry and the fight for it must be waged by the industry. Until it is realized that an industry, rather than a state or federal agency, is the source of and the power behind disease control laws, that industry will be plagued with diseases.

In California, the Department of Agriculture is making an earnest effort to bring about legislation intended to prohibit the feeding of raw garbage to swine. Despite the perfectly apparent necessity of preparing to cope with the national emergency and to meet the inevitable eradication movement when it arrives in California, the effort has met, and is meeting powerful opposition from garbage feeders, the California Farm Bureau Federation and the League of California Cities.

The garbage feeder opposes such legislation because he believes it will force him out of business. He will be required to install expensive cooking machinery and revise his present feeding methods at considerable, if not prohibitive, expense. The fact that more than 1,700 tons of wet garbage are produced every day in Los Angeles County alone, will give some idea of the magnitude of the cooking or disposal problem. It is not difficult to understand the garbage feeder's point of view, even though it be selfishly inspired.

The large cities, especially those in Southern California, would be confronted with a monumental problem to provide alternate means of disposing of hundreds of extra tons of garbage each day if the feeder is forced out of business or his operations curtailed. Revenue from sale of garbage, amounting to hundreds of thousands of dollars annually, may be lost to the cities. Prospective costs of providing machinery, collection service and new land areas, adequate for handling and disposing of hundreds of tons of wet garbage daily, present an acute fiscal, as well as a sanitation problem to the cities. This cannot be easily ignored.

Why the California Farm Bureau Federation has espoused the cause of the garbage feeders is not clear. The Farm Bureau is in open opposition to recommendations of the California Department of Agriculture, California Department of Public Health and the leading animal disease control minds of the State and Nation. Its position has been publicly stated before the Joint Legislative Committee on Agriculture and Livestock Problems.

The livestock industry of the Nation, in fact the agricultural economy of the Nation, is as vitally concerned with the raw-garbage problem as is the swine industry. Foot-and-mouth disease and other serious animal diseases are a constant threat to the welfare of agriculture through the medium of raw garbage as a carrier of disease.

If cholera and vesicular exanthema are to be eradicated, it is fundamental that raw garbage be discontinued as a feed for swine. To effect this will require the combined efforts of everyone connected with the swine and livestock industry, the packing industry, veterinary and allied professions —all striving to build a protesting public opinion so determined and forceful as to finally put down these animal plagues and so clean our house that we no longer will be forced to live with them.

FRANK M. KRAMER DIES AFTER LONG CAREER WITH DEPARTMENT

Frank M. Kramer, of Los Angeles, Supervising Inspector of the Bureau of Fruit and Vegetable Standardization of the California Department of Agriculture, passed away suddenly on October 5th while returning with Mrs. Kramer from a vacation trip to Yellowstone National Park.

Mr. Kramer was in charge of the Southern California work of the bureau. His valuable services with the department covered almost 27 years. In fact, most of his life had been in agriculture, especially with reference to the grades and standards of agricultural products shipped not only to California and United States markets, but to foreign countries. He was outstanding for his assistance in improving grades and standards of quality applying to fruits and vegetables and was an acknowledged expert on citrus fruits and avocados. Mr. Kramer's congenial approach to industry members in the enforcement of state laws relating to the quality of products packed and shipped not only achieved compliance, but maintained the respect and friendship of the people affected.

Mr. Kramer was born in Cincinnati, came to California as a young man, and entered the citrus industry. In 1915 he was employed by the Sierra Madre-Lamanda Citrus Association; five years later, he was promoted to the managership of the North Whittier Heights Citrus Association, becoming the youngest manager of any citrus packing house. During his term as manager, he directed the building of the North Whittier Heights plant.

Following these accomplishments, Mr. Kramer was engaged as manager of the Bradbury estate at North Whittier Heights; this service was terminated about 1923, when he became a member of the Los Angeles County Agricultural Commissioner's office in the inspection of fruits and vegetables.

In 1926 Mr. Kramer entered the service of the California Department of Agriculture at Los Angeles, and within a few years was made supervising inspector in charge of the Southern California district.

During his years with the State, Mr. Kramer was an active member of the California State Employees' Association and representative at several annual conferences; in addition, he was affiliated with the C. S. E. A. Credit Union, and was an officer of the local Los Angeles branch.

AN OUTBREAK OF SCRAPIE IN CALIFORNIA SHEEP

By Drs. J. E. Stuart, R. K. Allen, Gordon Shultz, P. D. DeLay and A. C. Rosenberger

A disease in sheep, which never before had occurred in California, was observed on August 23, 1952, in two flocks in Butte County by veterinarians of the State Bureau of Livestock Disease Control. The animals were rubbing against various objects on which were hanging fragments of wool. Skin scrapings were taken and the parasitologist in the Sacramento laboratory was unable to find any evidence of scab mites. On reviewing the literature, the district veterinarian assigned to the case became suspicious that these sheep were infected with scrapie. These two flocks of 543 purebred Suffolk sheep had 19 clinically affected animals which ranged in ages from $2\frac{1}{2}$ to $3\frac{1}{2}$ years or over.

Scrapie is a virus disease affecting principally the central nervous system. Under natural infection it has an unusually long incubation period, from one year to three years and over. The disease therefore is not observed in lambs under one year of age. The appetite of the animals is not disturbed and there is no elevation of temperature. Affected animals gradually lose condition. The outstanding symptoms are pruritis, rubbing against objects, causing pieces of wool to break loose leaving bare spots (Figure 1), and biting the legs, flanks, and belly. The wool becomes unusually dry. Pinching of the skin along the back causes nibbling movements of the mouth. These symptoms are followed by muscular incoordination, knuckling, and clonic spasms extending over the thoracic and abdominal areas. Sometimes goose stepping occurs in the later stages. The disease ends fatally.

In checking on origin of the animals, it was found that one of the owners had imported about 100 purebred Suffolk sheep from Ontario, Canada, on October 19, 1948, and that some of them were sold to the other owner. Further research disclosed that there have been outbreaks of scrapie reported in Ontario, Canada, in 1945, 1951 and 1952.

English and Canadian pathologists report a vacuolation of the neuron cells of the medulla as almost a constant finding. Brains of some of the affected sheep in Butte County were examined histologically and vacuolation identical to that reported in the literature was observed. (Figure 2.) All tests for evidence of known pathogens in these sheep were negative. Tests for thallium conducted by the chemistry laboratory on liver and kidney specimens were negative. The weed botanist of this department went over the premises involved and was unable to observe any toxic plants. The Bureau of Livestock Disease Control then established a diagnosis of scrapie.

The diagnosis of scrapie was reported to the United States Bureau of Animal Industry, Washington, D. C. The bureau assigned two of its

FIGURE 1. Scrapie infected sheep showing spots where wool has been rubbed off

veterinarians, Drs. C. L. Davis and H. E. Kemper, to investigate the disease. These veterinarians made studies of the problem both in the field and in the laboratory with Dr. W. A. McDonald, Veterinarian-in-Charge for the United States Bureau of Animal Industry, in California, and they concurred with the state diagnosis that the disease was scrapie.

The disease can be spread by contact and pasture exposure, but is believed to be principally transmitted to the offspring congenitally.

According to the literature, it appeared that the cases of scrapie in Butte County, California, were the first occurrences in this country. We now have received a news release dated January 4, 1953, from the Extension Service of the Michigan State College stating that veterinarians of that college diagnosed a mysterious sheep disease as scrapie in 1947 and the sheep involved were quarantined by the Michigan State Department of Agriculture. Apparently there was no federal quarantine issued at that time.

In the three outbreaks reported in Canada, an attempt was made to control scrapie by slaughtering all of the infected and exposed sheep. The disease appeared in Australia last summer, and in July, 1952, it was first reported in New Zealand. In every instance where the disease appeared in Australia, Canada and New Zealand, it occurred in sheep imported from England. In all instances the three countries involved attempted to eradicate by slaughtering all infected and exposed animals.

On November 3d the California Division of Animal Industry and the United States Bureau of Animal Industry initiated an agreement to eradicate scrapie in the California flocks by the slaughter method, sharing equally in the cost. All of the 643 sheep on the two infected ranches in Butte County have been disposed of by slaughter and the owners will be indemnified.

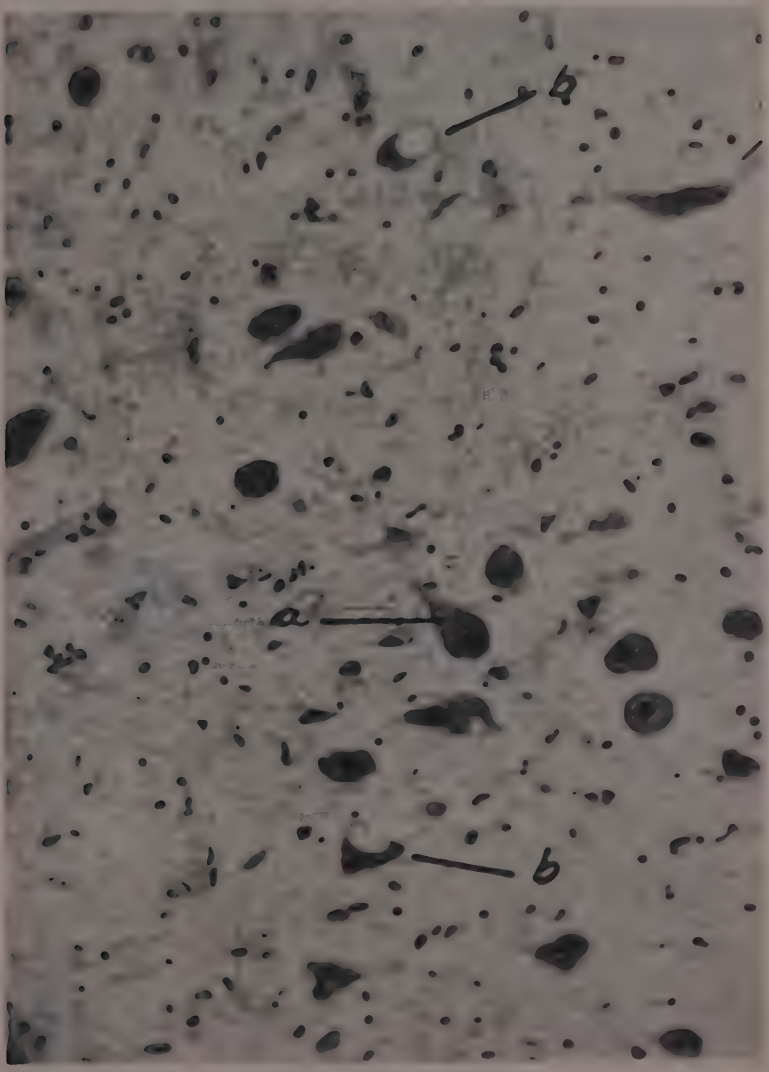

FIGURE 2. (a) Normal Neuron
(b) Vacuolated Neurons

On investigation it was determined that the breeder who made the importation from Canada also had sold breeding sheep to 51 owners located in Butte, Colusa, Glenn, Tehama, Riverside, Nevada, Lassen, Sonoma, Humboldt, Sacramento and Napa Counties. All of these sales were traced, "hold orders" served on the owners, and inspections made on the purchased sheep and the flocks into which they had gone.

The eradication procedure on the noninfected bands then consisted in slaughtering only the animals that originated from the infected band as well as any purebred sheep they might have exposed by breeding. Most of these were disposed of at rendering plants as they were in small lots not practical to ship for salvage. There were 363 exposed sheep in 51 bands destroyed. A grand total of 906 sheep were slaughtered from 53 separate flocks. All of the slaughtered animals were appraised by federal and state veterinarians. Where the owners could present satisfactory evidence that the animals were registered as purebred, or were eligible for registration, the appraisal was not over three times the estimated meat value. The eradication in connection with the 53 flocks was completed on January 7, 1953, and the owners are to receive indemnity amounting to the difference between any salvage obtained and the appraised value. The Federal and State Governments will share equally in the indemnity payments.

GARDEN BAGWORM, *APTERONA CRENULELLA (-HELIX)* IN NEVADA AND PLACER COUNTIES, CALIFORNIA

By Dan Robinson, Entomologist, State Department of Agriculture

INTRODUCTION

The recent finding of this insect which extends the known range of its infestation has again brought to the foreground the subject of its possible economic importance. The information embodied in this article comes in the main part from an investigational study made in cooperation with the office of the Agricultural Commissioner of Nevada County, Mr. L. G. Lageson, during the 1950 season.

Since the published accounts of this insect are virtually nonexistent in this country, acknowledgment must be made for the invaluable assistance of Frank Morton Jones of Wilmington, Delaware, in supplying information on the species (in the way of excerpts) from European literature. (It must be understood that the observations recorded here are those of a single season of limited study in this area.)

So far as has been ascertainable from the limited available literature and from correspondence, this insect is an introduced form native to eastern Europe or western Asia. It has been listed as effecting minor injury to apples in southern Russia [1] and in the vicinity of Venice, Italy.[2] Published accounts in this country are limited to a brief mention by Keifer,[3] but the European literature is quite extensive and dates back to 1850. The first record of this insect in California (and so far as is known in the United States) was an infestation found by F. F. Brasher in a house-yard in Nevada City, Nevada County, July 18, 1940, in association with violets, chrysanthemums, and plantain. Since that time, infestations have been found ranging up to 30 air miles from the original finding and covering an area of approximately 60 square miles in Nevada County plus the two isolated areas near Gold Run and Georgetown in Placer County.

CLASSIFICATION

Garden bagworm is a member of the Psychid family of moths, commonly called bagworms due to the characteristic habit of the larvae in spinning silken cases to which are attached bits of leaves, sticks, grains of sand, and other similar materials. This is a fairly large family in which the males are all normally winged swift fliers, while the females are often highly specialized, larviform, wingless or with reduced wings, with or without legs and antennae, and live concealed in a bag or case. In this family the caterpillars have strong thoracic legs with the prolegs reduced to crotchets. Pupation occurs in the attached, closed cases where

[1] Review of Applied Entomology Vol. IV, 1916, p. 210 and Vol. III, 1915, p. 393.
[2] Review of Applied Entomology Vol. XII, 1924, p. 186.
[3] California Department of Agriculture Bulletin, Vol. XXIX, No. 4, p. 244.

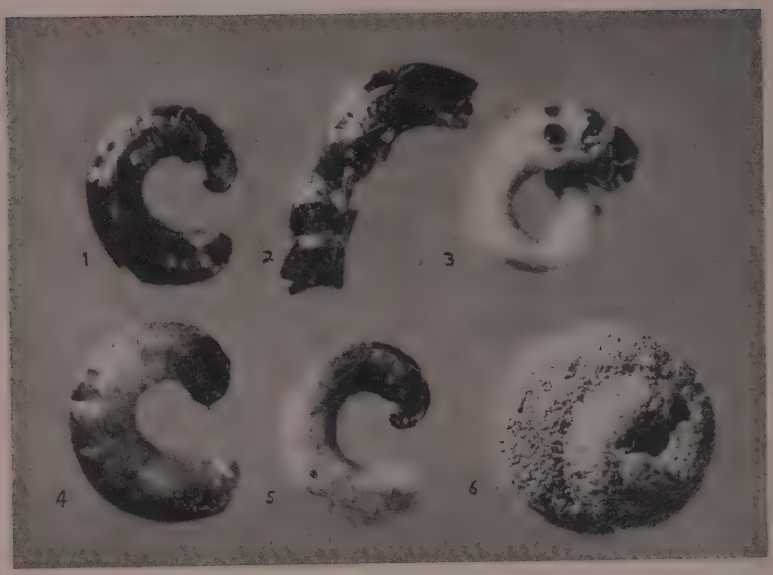

FIGURE 1. (1) Pupal case showing ovipositing female partly protruding from anterior opening. (2) Pupal case torn open to show overwintering stage of larvae. (3) Fully grown larva removed from pupal case. (4) Pupa removed from case. (5) Adult female moth removed from pupal case showing abdomen filled with eggs. (6) Case viewed from above showing granular composition and exit hole in upper whorl.

the female remains until fertilized. Eggs are laid in the cases and carry over the winter in most instances, although the species under discussion overwinters in the larval form. Parthenogenetic species occur in the family and thus far only females of the insect have been found in the California populations. In Europe, however, it has been reported that this insect appears in three types of population: with males and females equal, with only a small percentage of males, and with only parthenogenetic females.

There has been considerable confusion concerning the nomenclature of this species and Frank Morton Jones, a specialist studying the Psychid family of moths, has this to say about specimens sent him from the Nevada County infestation.[4]

"As will appear below, there seems no reasonable doubt that the insect is the European *Apterona helix* Siebold. In Lepidopterorum Catalogus, Part 34, Psychidae by Dalla Torre and Straud, you will see by pages 102-105 that the insect has a very extensive European literature, well up towards 200 citations. These authors call it *Apterona crenulella* Bruand, type description Mem. Soc. Emul. Doubs. (2) 3, 1852; but they list under the same species 'female parth. *helix* Siebold, Jahresher, Schles. Geo. 6 vaterl. culture 1850,' which gives time precedence to the name *helix*, which name certainly applies to the parthenogenetic female of wide distribution.

[4] Correspondence May 16, 1950.

"In the very extensive literature over succeeding years, there has been doubt expressed whether the names *crenulella* and *helix* relate to one species or two. Dalla Torre and Strand as noted above consider that they apply to a single species and in this seem to have been followed by most authors.

"I have sent Dr. Narbel specimens from the Nevada City infestation, and she finds no reason to separate them from *helix* as she has studied the species."

DESCRIPTION OF STAGES

The eggs are a very pale yellowish white, soft-shelled, and somewhat elongated, although of no definite shape due to being squeezed together in the pupal case in which they are laid. Prior to hatching, the form of the embryonic larvae can be seen in the egg doubled into V-shape.

The newly hatched larvae are about 1 mm. long, reddish-gray in color, with darker reddish dorsal sclerites on the thoracic segments, have a dark head, and the abdomen is tapered posteriorly. Mature larvae attain a length of 6-7 mm., are greenish- or reddish-gray, with the dorsal thoracic sclerites and anal plate greenish- or reddish-brown, and the head nearly black. The thorax is very robust, being usually at least twice the diameter of the tip of the tapered abdomen, and the thoracic legs are very strong, while the prolegs are reduced to crotchets. The larvae are spiral in form so as to fit the lower whorl of the helicoid case.

The bag or case is begun within a few hours after the emergence of the young larvae in the spring, at which time it consists of grains of soil or dust adhering to the body, or scattered threads. By the end of the second week the case consists of a rather tough silk sac coated externally with soil granules and is in the form of an inverted J or U. The case of the mature larva is helicoid or snail-like with 3-3½ whorls, is very tough and the soil granules are firmly attached. The cases reach a size of 3-5 mm. in diameter and have a lateral opening in the upper or smallest whorl through which fecal matter is extruded.

The pupae are 5-6 mm. long, curved in a gentle spiral form, yellowish-brown, and slightly diminished anteriorly. They are indistinctly segmented, although the spiracles show plainly. The larvae reverse their position in the case prior to pupation so that the pupae are found in the lower whorl of the case with the anterior end directed upward away from the attached lower aperture of the case.

The adult female moth of this species is merely a highly specialized egg laying device. Wingless, nearly legless, and without antennae, she has simple, dark, apparently nonfaceted pigment spots for eyes. The body is 5-6 mm. long, curved in a spiral form, gray in color with the dorsal thoracic segments brownish. The body is very sparsely covered with white hairs except for more dense lateral tufts near the tip of the abdomen. The anterior part of the body is reduced and laterally compressed with mere conical processes representing the legs. The small and elongate head, bearing degenerate and apparently useless mouth-parts is angularly and strongly bent downward. The somewhat swollen abdomen is thin skinned and almost wholly taken up by the eggs which can be seen through the skin. Some of the internal organs such as, what appear to be, the light colored urinary vessels and the darker ventral nerve chain are also visible.

FIG. 2. Overwintering bagworm on apple twig from Nevada County, California

SEASONAL HISTORY AND HABITS

This species overwinters as young larvae which can be found within the pupal skin of the parent inside the attached case lying in V-shaped positions among or on the empty egg shells from which they hatched in the fall. The period of larval activity in Nevada County was found to be from around mid-April through the first half of July. Accurate data on percentages of emergence by any particular date could not be obtained due to the difficulty of separating cases formed the previous season from those formed earlier, since the cases resist weathering to an amazing degree. An attempt was made, however, to choose only those cases attached to the previous year's growth of young apple trees for these counts. Of cases collected March 15, 1950, about 45 percent were empty; of those collected April 14th, nearly 60 percent were empty; of those taken April 18th, 96 percent were empty. It is possible that emergence of larvae from 45 percent of the cases had occurred by March 15th, but it is not likely, since thorough search failed to indicate the presence of active larvae prior to the first part of April. Larvae removed from their cases artificially on March 15th, became immediately active at room temperature of 73 degrees F. and began feeding on potted pansy plants within a few hours; however, cases containing larvae and held most of one day at the same temperature failed to show any emergence naturally. The 45 percent empty cases in the field on that date may indicate that that proportion of the cases collected were from a previous year or that males exist in that proportion, although no males have been taken in California.

Upon emergence from the parent case the larvae are naked, but soon form cases of their own in which they remain until adulthood. The case is held upright and the larva moves about or feeds with the forepart of the body projecting from the lower aperture of the case. The case may be drawn tightly to the leaf or the larva may withdraw from sight into the case when disturbed, maintaining attachment to the leaf by means of a thread up which it will climb should the case fall from the leaf. Young larvae evidently drop to low-growing food plants by means of these threads since they were first found feeding on ground cover plants in oval patterns extending to the lee sides of the trees.

Larval damage was first noted during the second week in April on clovers, wild radish, California mugwort and alfalfa, which made up the major percentage of the ground cover at that time. Preference was shown for low-growing plants as hosts, at least during the early part of the season, although the foliage of shrubs and trees was freely attacked later in the season. Early damage showed up as concavities one-thirty-second to one-sixteenth inch in diameter scraped out of either the upper or lower leaf surface. Later damage showed an increase in diameter to about one-eighth inch to be the limit of the leaf surface eaten and further injury was effected by mining between the surfaces as far as the larvae could reach without leaving their cases. Mined areas, usually roughly oval in shape, ranged up to one-fourth inch in width and three-eighths inch in length. Feeding continued in the Nevada County infestations through June.

When mature, the larvae generally leave low-growing hosts to search out the highest point available to them as suitable for attaching their

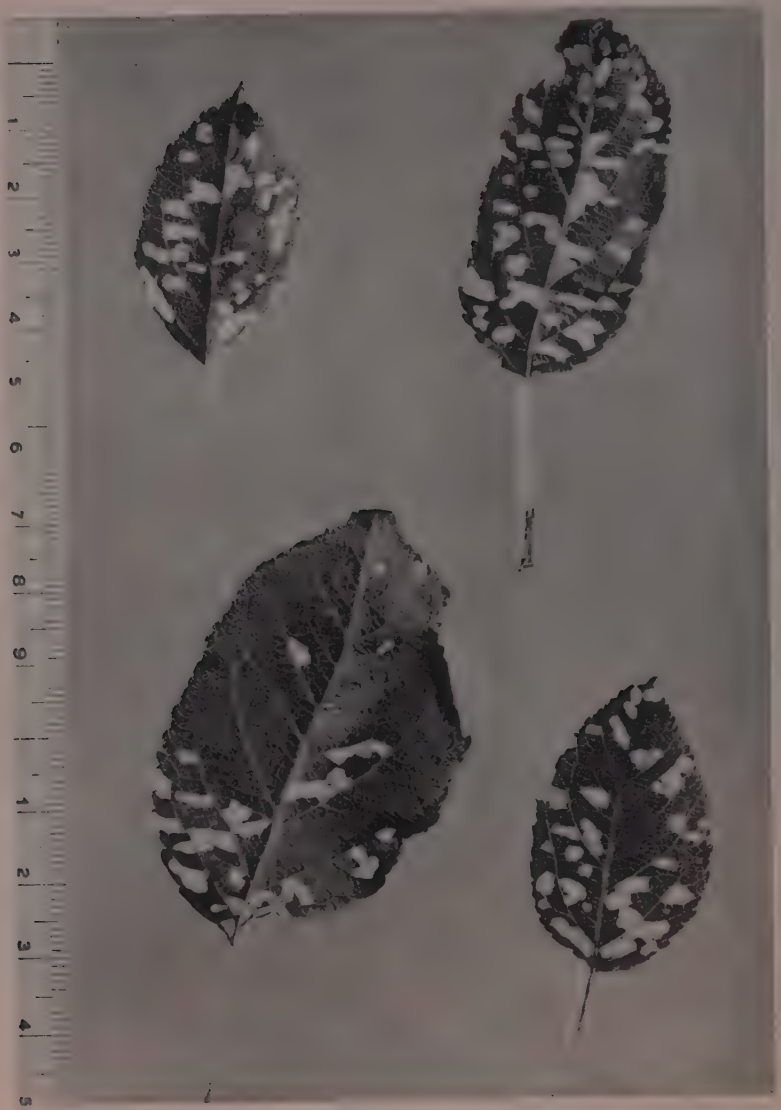

FIGURE 3. Injury to apple leaves from orchard in Nevada County, California

cases for the winter. Overwintering cases were commonly found high in trees, on posts, stone walls, or buildings. After securely attaching the case, which closes off the lower aperture, the larva reverses its position so that the head is away from the point of attachment and transforms to the pupal stage. A high percentage of cases containing pupae were found early in July, along with a few cases containing adults. The length of the pupal period and preoviposition period has not as yet been determined for this insect in the California infestations.

The 10 to more than 30 yellowish-white eggs are laid in the pupal case which remains in the lower whorl of the attached case. The average number of eggs per case in the Nevada County infestation is 25.16 as determined from a small number of cases. After oviposition, the moth, which is much shrivelled and shrunken in size, crawls out of the case through the lateral opening in the uppermost whorl, then evidently falls to the ground to die. The eggs hatch within three weeks and the young larvae remain in the pupal case inside the attached parent case over the winter. By the first of August no further adults were to be found in the cases, and a high percentage of them contained young larvae.

EXTENT OF INJURY AND CONTROL

Complete surveys to show the amount of damage resulting from this pest in California have not been made. Some commercial crops have been considerably damaged when populations were high. It has been estimated that losses of 65 percent of the leaf surface of some plants such as turnips and radishes, and 20 percent of the leaf surface of the more heavily infested young apple trees have occurred. Damage to ornamental stock such as chrysanthemums, pansies, violets, gaillardia, and zinnias grown for the cut-flower trade has resulted in reduction or retarding of flowering, and in poor appearance of the plants in at least one nursery in Nevada City for several years.

Limited control trials were made against this pest on chrysanthemum cuttings in the nursery mentioned as well as on young apple trees in an orchard near Peardale. Two insecticides, 10 percent DDT and 5 percent chlordane, were used in dust form. The chrysanthemum cuttings treated were 8-10 inches in height and were divided into plots of about 400 plants per plot. The dusts were applied with a Hudson hand duster on a warm afternoon with very little breeze. One plot was left untreated as a check plot. The apple trees treated were similarly divided into three groups of two trees each and the dusts were applied the following day. From these limited trials it would appear that either dust will give control, with DDT showing the better results. Figures relating to these trials appear in Chart I.

Contact insecticides were used in the control trials due to the leaf mining feeding habits of this species; however, stomach poisons could probably be used with good results if so timed as to be applied when larvae are young and a greater proportion of their food intake would consist of leaf surface matter. Several attempts at control using arsenicals have proved ineffectual, probably due to improper timing of application. Increase of the insect has been successfully held down over several seasons in one apple orchard by the owner's spray program for other pests consisting of lead arsenate, nicotine sulfate, and wettable sulfur sprays.

Careful consideration and appraisal of controls are still necessary since inconsistencies have occurred where quite heavy infestations one season have nearly disappeared the next with no controls.

HOST PLANTS

The host plant list, although reaching impressive size, is not complete. The plants listed below were those on which larvae were found feeding during the 1950 season in the Nevada County infestations. Capital letters following plant names indicate the degree of leaf injury which bears a close relationship to susceptibility to attack of the host concerned: (H) heavy, (M) medium, and (L) light.

Alfalfa (M)
Apple (M)
Black mustard (H)
Broccoli (L)
Cabbage (L)
California mugwort (H)
Chrysanthemum (H)
Clovers
  Wild clover (M)
  Ladino clover (M)
Common brake fern (M)
Gaillardia (H)
Giant marigold (M)
Gladiolus (L)
Grasses
  Ripgut (L)
  Rough stock blue (L)
  Wild oat (M)
  Meadow foxtail (L)
Hoarhound (L)
Hollyhock (L)
Lupine (H)
Pansy (H)
Plantain (H)
Rose (L)
Sidalcea (L)
Statics (H)
Sour dock (M)
Sweet pea (M)
Trefoil (H)
Tomato (L)
Turnip (H)
Vetch (M)
Violet (H)
Wild radish (H)
Zinnia (H)

ECONOMIC IMPORTANCE

Since its discovery in California 12 years ago, the bagworm has been reported as causing only moderate economic injury to crop hosts where infestations occur. It also has been listed as effecting only minor injury to apples in southern Russia and near Venice, Italy. It is thought that this insect requires a prolonged exposure to low winter temperatures in order to maintain itself. This is somewhat borne out by its distribution in California only at elevations above 2,000 to 3,000 feet. The consensus of those concerned has been that the bagworm will not become an important pest on crop hosts which receive regular applications of insecticides for other insect pests. Greatest danger of buildup would seem to be on wild hosts, pastures, roadside weeds, or untreated crop hosts.

There is considerable danger of the bagworms being spread through the agency of appliances which move from one location to another. This is due to the insect's habit of attaching itself to nearly any available object to overwinter. By this means, it is possible that large numbers of bagworms might be transported great distances while attached to picking boxes, trucks, machinery or other appliances. If parthenogenesis occurs as is thought, a single specimen thus transported could conceivably result in an infestation the following year because the host range is so great that the insect would almost inevitably end up near a food plant. If prolonged exposure to low temperatures is required, it seems likely that such spread will occur but that it will be limited to areas with adequate winter climatic conditions.

Insecticidal Control Trials Against Garden Bagworm

On chrysanthemum	Larvae per plant May 31, 1950	Larvae per plant June 9th	Larvae per plant June 19th	Percentage killed
10% DDT	7	0.2	0	100
5% Chlordane	4	0.5	.005	99.87
Untreated	4.5		4.5	0

On apple	Larvae per tree June 1, 1950	Larvae per tree June 19th	Percentage killed
10% DDT	125	8	93.6
10% DDT	60	3	95.0
5% Chlordane	100	45	55.0
5% Chlordane	40	15	62.5
Untreated	50	50	0
Untreated	60	60	0

1950 Season.
Chrysanthemum in Sunnyside Nursery, Nevada City, Calif.
Apple on Baker property near Peardale, Nevada Co., Calif.

DR. GEORGE A. PFAFFMAN

Dr. George A. Pfaffman, 67 years old, died in Los Angeles, California, on June 1, 1952, following an illness of several months.

Dr. Pfaffman graduated from the College of Veterinary Medicine, Ohio State University, in 1906, and then was employed for 11 years as a veterinary inspector by the United States Bureau of Animal Industry. He came to California in 1917 and was appointed deputy veterinarian. Two years later when the California State Department of Agriculture was organized he became field veterinarian in the Division of Animal Industry. He gained several promotions, finally achieving the title of livestock disease control specialist.

Dr. Pfaffman took an active part in many livestock disease control activities in the State. He participated in the ultimate eradication of glanders in horses and scabies in cattle and sheep. He tuberculin tested many herds of cattle in the tuberculosis control program and later supervised the work in certain areas.

In July, 1948, Dr. Pfaffman was made district veterinarian in charge of livestock disease control in six northern counties, with headquarters at Redding. He retired from state service on August 31, 1950.

A NEW SCALE INSECT FROM THE RYUKYU ISLANDS RELATED TO RED SCALE

(Homoptera: Coccoidea: Diaspididae)

SCALE STUDIES—PART XI

By Howard L. McKenzie
State Department of Agriculture
Sacramento, California

The story of the discovery of this new scale insect presents some points of interest. The collector of the scale is Mr. A. P. Messenger, Chief, Bureau of Plant Quarantine of the California Department of Agriculture. He was requested by the Pacific Science Board of the National Research Council to be an adviser to the United States Army in the establishment of a plant quarantine system in the Ryukyu Islands. Before he departed in early August, 1951, the author asked him if he would attempt to collect a scale, *Aonidiella sotetsu* (Takahashi), which was known to occur in the Ryukyu Islands, and which was extremely rare in collections. A memorandum was prepared listing specific localities and hosts of *sotetsu* in the Ryukyu Islands, and this was handed to him before he departed.

Mr. Messenger was unsuccessful in obtaining examples of *sotetsu,* even on the hosts listed which apparently were preferred, but instead, on another host, *Calophyllum inophyllum* (Guttiferaceae) he did find a few specimens of what are here considered to represent a new species of *Aonidiella.* The author takes great pleasure in dedicating this new species in Mr. Messenger's behalf, and wishes, furthermore, to express his appreciation for the effort made in collecting this scale insect. A description of the species is here presented.

HOSTS AND DISTRIBUTION. Type and paratypes from *Calophyllum inophyllum* (Guttiferaceae), Miyako Gunto, Ryukyu Islands, September 5, 1951, by A. P. Messenger. Additional paratypes were collected later (1952) at Taipeh, Taiwan on *Bladhia siebaldi* by Tsing-chao Maa, these examples made available to the author by Dr. Stanley E. Flanders of the University of California, Citrus Experiment Station at Riverside, California.

HABIT. Occurring on the leaves. Scale of the female approximately 1.50 mm. in diameter, circular, thin and translucent with the reddish body of the insect showing through. The scale develops a wide, grayish-white marginal zone much exceeding the body of the insect itself. Scale of the male elongate, and with body color similar to female.

RECOGNITION CHARACTERS. Adult female as mounted averaging approximately 1.0 mm. long and 1.0 mm. wide. Body reniform, similar to that of the genotype; prosoma sclerotized in the manner typical of the genus; perivulvar pores absent; prevulvar scleroses present but only very slightly developed and extremely variable, often with only one scleroses showing on a side, prevulvar apophyses (actually these appear more as a scleroses) also but slightly developed and noticeably variable, often appearing only on one side of body or infrequently completely missing, both prevulvar scleroses and apophyses situated on pygidium in same position as in typical *Aonidiella aurantii* (Maskell), see Figure 1 (A); three pairs of pygidial lobes present, the median pair largest and once-notched on either side, the second slightly smaller but similarly notched, the third smallest, once-notched on inner margin and either once or twice notched on lateral margin, fourth lobe developed as a sclerotized point; pygidial plates typical for the genus; dorsal pygidial macroducts in three quite well-defined rows, those of the median row of the same length and diameter as the others; paraphyses small and slender, not present beyond third lobe; fenestrations on prosoma either present or absent; vulva situated about mid-pygidium; anal opening relatively large and located about one-fourth distance from median lobes on pygidium; thoracic tubercle present, somewhat variable, situated on body margin approximately opposite from position between anterior and posterior spiracles.

NOTES. In the presence of the weakly developed prevulvar scleroses and apophyses (actually the apophyses appear more as scleroses) this species is apparently most closely related to the genotype, *Aonidiella aurantii* (Maskell). It differs from the latter, however, by possessing a thoracic tubercle. It resembles *Aonidiella taxus* Leonardi in external appearance of the scale i.e. the same color with an extended grayish-white marginal zone much exceeding the body of the insect itself, and in the presence of a thoracic tubercle. It is different from *taxus* in having narrower pygidial lobes, and a gradation in size of these lobes. Furthermore, *taxus* is apparently restricted in the hosts it attacks to members of the Taxaceae.

This species was described from 10 specimens from the type lot, these mounted on 10 separate slides, and from 15 paratype specimens from Taiwan, these mounted on 9 slides. The type specimen of this species will be deposited in the United States National Museum, Washington, D. C., and remaining paratypes in the State Department of Agriculture collection at Sacramento, California, and in the author's own collection.

Revised couplets of the author's * 1946 "Key to Species of *Aonidiella*" is here presented to include the new species, *Aonidiella messengeri:*

7 (6) Prevulvar apophyses present 8
Prevulvar apophyses lacking 9

8 (7) Prevulvar scleroses and apophyses present, these apophyses at times appearing as scleroses ..... A
Prevulvar apophyses alone present ..... citrina (Coquillett)

A (8) Thoracic tubercle present on body sides approximately opposite posterior spiracles ..... *messengeri* McKenzie n. sp.
Thoracic tubercle absent ..... *aurantii* (Maskell)

9 (7) Thoracic tubercle present on body sides ..... B
Thoracic tubercle lacking on body sides 10

B (9) Pygidial lobes all large and approximately of the same size and shape, the second pair often slightly larger than the median; occurring only on members of the Taxaceae ..... *taxus* Leonardi
Pygidial lobes variable, but the second and third lobes always smaller than the median pair ..... *messengeri* McKenzie n. sp.

* McKenzie, Howard L. Supplementary Notes on the Genera *Aonidiella* and *Parlatoria*. (Homoptera; Coccoidea; Diaspididae.) Microentomology, Volume 11, Part 1, pages 32-33, 1946.

Aonidiella messengeri McKenzie, new species

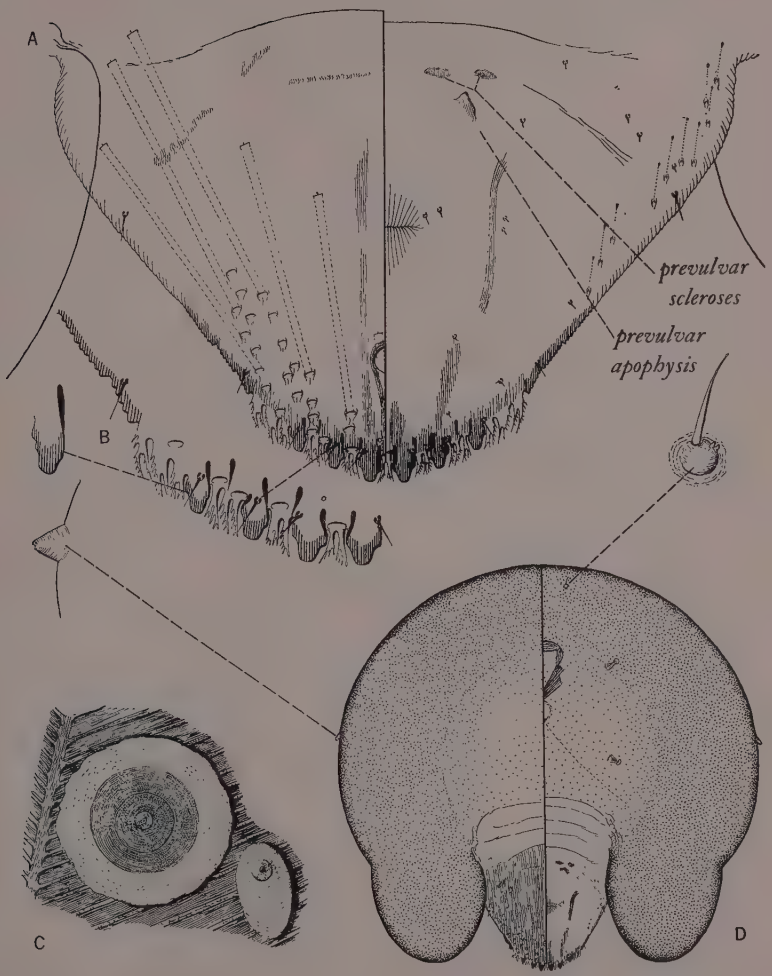

FIGURE 1. *Aonidiella messengeri* McKenzie, new species. Collected at Miyako Gunto, Ryukyu Islands, September 5, 1951, on *Calophyllum inophyllum* (Guttiferaceae) by A. P. Messenger.

LEGEND FOR FIGURE

A, pygidium of the adult female; B, details of the dorsal aspect of the pygidial margin; C, habit; D, body of the adult female. Unlettered details are connected to their points of origin by guide lines and should be readily identifiable.

The figure was prepared by the author. It is based upon well stained examples which emphasize the derm sclerotization.

CURRENT INSECT NOTES

H. M. ARMITAGE
Chief, Bureau of Entomology
California Department of Agriculture

During the past three months several insect pest species have been found for the first time in California and certain others of limited occurrence within the State have shown outward spread.

Larvae of the lotus borer (*Pyrausta penitalis*) have been submitted from two widely separated locations representing first records in the State. On December 2, 1952, a single specimen was found by Guy Beevor of the State Department of Agriculture, among miscellaneous insect material separated out during the mechanical examination of cotton gin trash at Bakersfield. On January 20, 1953, a single larva was found by Roy Gamblin, San Bernardino County Deputy Agricultural Commissioner, boring within a stem of rhubarb in a field planting at Chino. Identification was made by Hahn W. Capps of the Bureau of Entomology and Plant Quarantine, U. S. Department of Agriculture.

According to H. H. Keifer, the larvae are 30-35 mm. long; dorsum brownish-black and plumbeous; venter near white; head light yellowish mottled with brown pigment; mandibles decidedly elongated with five teeth. It is considered native to the United States and widely distributed east of the Rocky Mountains. It feeds on the leaves and bores into the stems of its hosts which include pond lotus, *Nelumbo lutea,* smartweeds, corn, rhubarb, and related plants.

The borer is of interest because in the field it is often confused with the European corn borer and includes among its hosts many of those concerned with that major pest species. However, it is easily separated taxonomically from the latter, and as yet has failed to show any economic importance in the areas where it is present.

The Scotch broom aphid (*Ctenocallis setosa*) was found infesting Scotch broom, its only known host, in a nursery at Stockton in San Joaquin County and at Oakland in Alameda County. Specimens were submitted in the first instance on June 4, 1952, by County Agricultural Inspector D. Zuckswert and in the second instance on October 17, 1952, by County Agricultural Inspector J. V. Lonergan. These are the first and only records of this species within the State. It had previously been known from a single infestation at Medford, Oregon, where it was collected by L. G. Gentner and submitted to Professor E. O. Essig who described it as representing both a new genus and a new species, giving it the name *Gentnera oregona.* Later, however, he reports that it apparently represents the European species here reported.

The species is distinctive in having finger-like tubercules along the back and sides of both the winged and wingless forms giving it a "horned-toad" appearance. The economic importance of the species is not known though it demonstrated an ability to completely defoliate the seedling plants representing the Medford infestation. The infested plants

found at Oakland were, fortunately, immediately destroyed by the owner, although identification of the species involved was not announced until January 23, 1953. The Stockton infestation is being given delayed, but similar attention.

The riparian earwig (*Labiduria riparia* (Pallas)), new to California, was submitted by State Department of Agriculture Survey Entomologist Ronald M. Hawthorne, from Calexico, Imperial County, on November 21, 1952. He observed it hiding out during the day on the ground under boards and trash, and feeding in the open at night.

This insect is recorded as occurring in Eurasia, the Hawaiian Islands and in Yuma, Arizona. It is primarily predaceous, feeding on plant material only occasionally. George Okumura, department taxonomist, who made the identification, describes it as brown-black winged with the tips of the hind wings protruding wedge-like behind and beyond the tegmina; average length from head to tip of forceps, 25 mm.; inner border of the tegmina margined with pale brown. While its economic importance is questionable, it is being kept under observation.

The garden bagworm (*Apterona crenulella*) has recently been recorded in a 20-mile jump from Gold Run, Placer County, to Georgetown in El Dorado County. Specimens were submitted by Agricultural Commissioner Lowell Mobley on September 4, 1952, infesting pear on a sorting belt in a Placerville packing house and through the alertness of Hubert Davis, of the Bureau of Shipping Point Inspection, traced to a Georgetown orchard. The infestation itself was light but distributed over a considerable area among the orchard trees and buildings. There was evidence that it had originated with specimens attached to a small private spray rig previously used in the infested area in Placer County.

Specimens submitted on August 14, 1952, by W. S. Sibray, Deputy Agricultural Commissioner of Alameda County, disclosed the dusky-veined walnut aphid (*Callaphis juglandis*) on walnut at Niles. The only previous known infestation within the State was reported from Santa Clara County earlier in the same month.

This species is medium to large with reddish eyes and with dark gray bands along the wing veins; it is much larger than the ordinary walnut aphid, differing in feeding only on the surface of the leaf. It is native to Europe and Asia and reported only from Oregon in the Western Hemisphere. This species responds easily to standard insecticides used in the control of aphids. Also, local infestations have been materially reduced by direct exposure to the sun due to the fact that it occurs on the surface of the foliage.

The clover seed weevil (*Miccotrogus picirostris*) has made its appearance at Olinda, Shasta County, 50 miles south of the nearest previously recorded infestations. It was found on August 22, 1952, on ladino clover by Department Survey Entomologist H. T. Osborn.

The fig scale (*Lepidosaphes ficus*) was submitted on November 17, 1952, from fig at Buena Park, Orange County, by County Entomologist David H. Byers. This is the second record of this species in Southern California, the first being at Fullerton in Orange County. The infestation was found during the course of directed survey conducted by county personnel for olive parlatoria scale. This scale has been recorded as present in San Joaquin Valley and central coastal counties for many years, but only recently has it been found south of the Tehachapis.

During the examination of gin trash as part of the state-county cooperative survey being directed toward determining whether or not the pink bollworm occurs in California, two most unusual findings were recently recorded. Larvae of the navel orangeworm (*Myelois venipars*) were taken at Cawelo, Kern County, and at Mendota, Fresno County, both on December 15, 1952. This species is rapidly gaining importance in Northern California as a pest of almond. While it would hardly be expected to be attracted to a cotton boll, its habits as a scavenger make this possible.

Further extension in the occurrence of olive parlatoria scale (*Parlatoria oleae*) in Northern California is recorded in its findings at Willows, Glenn County, on November 10, 1952, which resulted from the interception by Agricultural Commissioner S. T. Ancell, Tehama County, of infested fruit arriving at Corning for processing; at Sonora, Tuolumne County, on December 10, 1952, it was found on privet by Agricultural Commissioner H. H. Sherrard, and at Lincoln, Placer County, on peach by H. J. Crawford, Entomologist, U. S. Department of Agriculture, during Hall's scale survey. The first two findings represent first records for the counties concerned. The latter represents the first outward spread in Placer County since the scale was reported at Roseville several years ago.

The pit-making pittosporum scale (*Asterolecanium arabidis*) has made its appearance in Amador County at Plymouth. Agricultural Commissioner R. Rebuffo submitted specimens for identification on February 3, 1953, which he had collected on native deerweed (*Lotus scoparius*) on open range. This infestation lies approximately 25 miles south and east of the nearest previously reported infestation at Folsom in Sacramento County.

This species is a serious pest of privet and pittosporum, two ornamentals used widely in California, in which it produces a serious "blooming" effect by its attack, seriously disfiguring the plant. It is the subject of eradication measures wherever found associated with nursery stock but is too widely distributed on its native host in certain areas to permit practical remedial measures.

The Egyptian alfalfa weevil (*Hypera brunneipennis*) was recently reported by Dr. A. M. Boyce, of the Citrus Experiment Station, Riverside, in numbers on alfalfa at Puente in Los Angeles County. This species attracted considerable attention when it first appeared in the Imperial Valley in 1939. It was subsequently rated as a minor pest of alfalfa being more restricted to yellow clover, and not of sufficient importance to merit remedial measures. During the past several months new infestations have been recorded in San Diego County but this is the most northerly record and the first in Los Angeles County. The original finding was made by Mr. Dietrick, of the Citrus Experiment Station during the course of unrelated field work.

Members of the taxonomic staff of the Department of Agriculture are responsible for all identifications unless otherwise indicated and the writer is indebted to them for detailed information on the previous history and description of species new to California.

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